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(54) **SYRINGE**
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(56) References cited:
EP-A- 0 298 585
DE-A- 1 766 151
US-A- 4 014 330
US-A- 4 424 057

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Description

TECHNICAL FIELD

This invention relates to prefilled syringe systems for the packaging of pharmaceutical preparations in dosage form, and more particularly to systems in which two components of a preparation, one of which is normally a diluent or solvent, must be stored separately and only admixed immediately prior to administration.

BACKGROUND ART

The applicants own prior application EP-A-0,298,585 describes several syringe systems for the packaging of two component pharmaceutical preparations, of which the system shown in Figures 11 and 12 is presently the most preferred. This system stores a solvent or diluent component in a specially formed flexible capsule 14, which is described in detail in that patent, and from which the contents are expelled by manual squeezing.

Shell vials are however a well known and widely available packaging for pharmaceutical diluents, and it would be desirable to utilise such a vial in a two component syringe system, so as to avoid the use of a specially designed capsule of the type shown in EP-A-0,298,585. A shell vial differs from a conventional pharmaceutical or serum vial in that it has no neck. Instead the top of the vial is of the same diameter as the remainder of the cylindrical side wall of the vial, and is closed by a piston quite similar to that utilized by the present applicant to close the bottom of its bottomless vial as described in EP-A-0,298,585

DISCLOSURE OF INVENTION

I have now found that the construction shown in EP-A-0,298,585 can be advantageously modified to utilize known shell vials in place of the capsule 14.

According to the invention, a prefilled syringe system for two component pharmaceuticals is provided, as set forth in the appended claims 1-5.

BRIEF DESCRIPTION OF DRAWINGS

Preferred embodiments of the invention are described with reference to the accompanying drawings, in which:

Figures 1A-1I are elevations illustrating successive stages in the assembly and preparation of use of a first embodiment of the invention, it being assumed for ease in illustration that most components other than those of rubber or metal are transparent; and Figures 2A-2G are elevations illustrating successive stages in the assembly and preparation for use of a second embodiment of the invention.

BEST MODES FOR CARRYING OUT THE INVENTION

Figure 1A shows an exploded view of the components of a separately assembled and sterilized unit 3 (see Figure 1B) for use in conjunction with a filled and capped vial 2 generally similar to that shown in Figure 12 of EP-A-0 298 585. The unit 3 comprises a shell vial having a cylindrical body 4 closed at one end, and a piston 6 closing its other end to enclose a quantity of pharmaceutical diluent. A moulded plastic tubular adaptor component 8 has a tubular connector 10 at one end similar to the connector element 70 of EP-A-0 298 585, and an internal thread 12 within its other end forms a coupling engaged with an external thread on a extension 14 forming a coupling configuration on the piston 6. A tubular plunger 16 has an internal thread 17 which can provide a coupling to an integral extension or other coupling configuration on a piston 32 of the vial 2. This plunger and a cap 18 are similar to corresponding parts shown in the EP. patent. The unit further includes a cannula needle 20, and a protective cap 22 which closes the open end of the cap 18 to maintain sterility and provide protection of the needle during storage. The cap 22 is removed immediately before use (see Figure 1C). The needle 20 is of the double ended type, and is located beneath the cap 18 by a flange 24. A connector 26 on the cap engages the connector 10 on the adaptor component 8 in the same way as the connector 27 engages the connector 70 in Figure 12 of U.S. Patent No. 5,137,511, so that one end of the needle 20 passes through the adaptor towards the piston extension 14, as seen in Figure 1B.

After the cap 22 has been removed (Figure 1C), as well as a flip-off protective cover 28 on the cap 30 of the vial 2, which protects a rubber closure of the vial held in place by the cap 30 (Figure 1F), the unit 3 is pressed onto the vial 2 (Figure 1F) so that the cap 18 is pressed over the cap 30 of the vial 2 so that the lower end of the needle 20 pierces a rubber closure of the vial 2. At the same time, the flange 24 is pressed upwardly within the cap IS and causes the upper end of the needle 20 to penetrate a septum within the piston 6.

The shell vial 4 is then pressed downwardly (Figure 1F) expelling its contents through the needle 20 into the vial 2. If necessary, the piston 32 within the vial 2 is positioned higher in the vial than normal so that it can be displaced downwardly to make room for the contents of vial 4 (see Figure 1G).

At this point, the assembly 3, with the exception of the cap 18 and the needle 20, is pulled away from the vial 2 by gripping the plunger 16 leaving the cap and needle in place on the vial (Figure 1G). The thread 17 of plunger 16 is then screwed onto the piston 32 of the vial 2 (Figure 1H) to form a syringe 34 (Figure 1I).

In the embodiment just described, the shell vial is dimensioned so as to fit within the tubular plunger. An alternative embodiment is shown in Figures 2A-G in which the shell vial 4 is dimensioned so that the tubular

plunger 16 has an external diameter less than its internal diameter. The same reference numerals are used to denote those components of this embodiment which are similar to those of the previous embodiment, and only the differences will be described. In this instance, the plunger 16 fulfils the functions of the adaptor 8, the screw threads on extensions of the pistons 6 and 32 being similar except that the thread 14 on piston 6 may be longer. The plunger 16 is a press fit on the connector 26 on the cap 18, which in this case is formed with a skirt 36 which fits over the top portion of the vial 2 and also provides a finger grip 38. The entire unit 3 (see Figure 2C) is assembled into a tubular sleeve 40 (Figure 2B) which together with the cap 22 maintains sterility of the unit during storage, and also facilitates preparation of the syringe. The vial 4 is a press fit within the upper end of the sleeve 40. After removal of the cap 22, the unit 3 is applied to the vial (Figure 2D) as in the previous embodiment, and the sleeve 40 is pulled downwardly (Figure 2E). As before, this forces the cap 18 onto the cap 30 of the vial, causing the needle 20 to pierce both the closure of the vial 2 and the piston 6 of the shell vial 4, and further downward movement of the sleeve 40 forces the contents of the shell vial into the vial 2. At this point the sleeve 40 is rotated to unscrew the piston 6 of the shell vial 4 from the plunger 16 (Figure 2F) which is then transferred to the piston 32 to complete the syringe.

It should be understood that the sleeve 40 could be omitted, although it is a convenience for packaging and manipulating the syringe, in which case the vial 4 would be manipulated directly rather than through the sleeve 40.

Variations in the above embodiments are possible. For some applications of the syringe, it may be desired to replace the needle 20 by some other cannula arrangement when the syringe is used, in which case a single ended needle may be located in the assembly 3 so that it will be forced upwardly as the cap 18 is forced onto the vial 2 (the cap in this case will have an internal cannula to pierce the closure of the vial), but will be retained within the shell vial when the latter is removed during preparation of the syringe. If a double ended needle 30 is used, in combination with a cannula, venting of the vial 2 to permit escape of air displaced by the contents of the shell vial 4 becomes possible.

Claims

1. A prefilled syringe system for two component pharmaceuticals, comprising the combination of first and second sub-assemblies, of which the first subassembly comprises a bottomless pharmaceutical vial (2) containing a first component of a pharmaceutical product, said vial having a filling neck, a penetrable closure retained on said neck by a first annular cap (30), and an open bottom end hermetically closed by a first piston (32) with a coupling configuration on the face of the first piston adjacent the open bottom end within the vial, and the second sub-assembly (3) comprises a receptacle (4) for a second, fluid component of the pharmaceutical product, a tubular plunger (16) having a coupling (17) at one end for subsequent coupling to the coupling configuration (14) of said first piston (32), a second cap (18) releasably connected to said plunger which can be force fitted to said first cap (30), and cannula means (20) projectable by force fitting of said first cap (30) to said second cap (18) to penetrate said penetrable closure, characterized in that said receptacle of said second sub-assembly comprises a shell vial (4) having an open end closed by a second piston (6), said tubular plunger (16) being concentric and in telescoping relationship with said shell vial, and in that said cannula means (20) is also projectable, upon force fitting of said first cap (30) to said second cap (18), to penetrate said second piston (6) and place said bottomless vial (2) and said shell vial (4) in fluid communication through said cannula means (2), whereby fluid from the shell vial is transferred to the bottomless vial upon telescoping said shell vial relative to said plunger (16).

2. A syringe system according to claim 1, characterized in that the shell vial (4) is of a diameter to telescope into said plunger (16), and adaptor means (8) are provided in said second subassembly extending between said second cap (18) and a coupling configuration (14) on said second piston (6) to maintain the position of the latter during telescoping of the shell vial relative to the plunger.

3. A syringe system according to claim 1, characterized in that the shell vial (4) is of a diameter to telescope around said plunger (16), and said means (17) on the plunger for coupling to the coupling configuration of the first piston (32) are initially coupled to coupling means (14) on the second piston (6).

4. A syringe system according to claim 3, characterized in that the components of the second subassembly (3) are assembled within a tubular housing (40), and the shell vial (4) is a press fit within the tubular housing.

5. A syringe system according to any one of claims 1-4, characterized in that the cannula means (20) is a double ended needle, with a flange (24) to control its longitudinal position received within the second cap (18).

Patentansprüche

1. Vorgefülltes Spritzensystem für Zweikomponenten-Arzneimittel, das die Kombination aus einer ersten und zweiten Baugruppe umfaßt, wobei die erste Baugruppe ein pharmazeutisches Fläschchen (2)

ohne Boden mit einer ersten Komponente eines pharmazeutischen Produktes umfaßt und das Fläschchen einen Füllstutzen, einen durch eine erste ringförmige Kappe (30) an dem Stutzen festgehaltenen durchdringbaren Verschluß und ein offenes Bodenende, das durch einen ersten Kolben (32) mit einer Kupplungskonfiguration an der Stirnfläche des ersten Kolbens neben dem offenen Bodenende in dem Fläschchen hermetisch verschlossen ist, aufweist und wobei die zweite Baugruppe (3) einen Behälter (4) für eine zweite flüssige Komponente des pharmazeutischen Produktes, einen röhrenförmigen Stempel (16) mit einer Kupplung (17) an einem Ende zum anschließenden Kuppeln an die Kupplungskonfiguration (14) des ersten Kolbens (32), eine zweite, lösbar mit dem Stempel verbundene Kappe (18), die durch Preßpassung mit der ersten Kappe (30) verbunden werden kann, und ein Kanülenmittel (20) umfaßt, das durch Preßverbindung der ersten Kappe (30) mit der zweiten Kappe (18) zum Vorstehen gebracht werden kann, um so den durchdringbaren Verschluß zu durchdringen, dadurch gekennzeichnet, daß der Behälter der zweiten Baugruppe ein Mantelfläschchen (4) mit einem durch einen zweiten Kolben (6) geschlossenen offenen Ende umfaßt, wobei der röhrenförmige Stempel (16) konzentrisch ist und in teleskopartig zusammenschiebbarer Beziehung mit dem Mantelfläschchen steht, und daß das Kanülenmittel (20) auch durch Preßverbindung der ersten Kappe (30) mit der zweiten Kappe (18) zum Vorstehen gebracht werden kann, um so den zweiten Kolben (6) zu durchdringen und das Fläschchen (2) ohne Boden und das Mantelfläschchen (4) in Fluidverbindung durch das Kanülenmittel (2) zu bringen, wodurch Fluid aus dem Mantelfläschchen bei teleskopartigem Zusammenschieben des Mantelfläschchens bezüglich des Stempels (16) zu dem Fläschchen ohne Boden übertragen wird.

2. Spritzensystem nach Anspruch 1, dadurch gekennzeichnet, daß das Mantelfläschchen (4) einen derartigen Durchmesser aufweist, daß es teleskopartig in den Stempel (16) geschoben werden kann, und daß in der zweiten Baugruppe Anschlußmittel (8) vorgesehen sind, die sich zwischen der zweiten Kappe (18) und einer Kupplungskonfiguration (14) an dem zweiten Kolben (6) erstrecken und so die Position des letzteren beim teleskopartigen Zusammenschieben des Mantelfläschchens bezüglich des Stempels aufrechterhalten.

3. Spritzensystem nach Anspruch 1, dadurch gekennzeichnet, daß das Mantelfläschchen (4) einen derartigen Durchmesser aufweist, daß es teleskopartig über den Stempel (16) geschoben werden kann, und daß die Mittel (17) an dem Stempel zum Kuppeln an die Kupplungskonfiguration des ersten Kolbens (32) anfangs an Kupplungsmittel (14) am zweiten Kolben (6) gekuppelt sind.

4. Spritzensystem nach Anspruch 3, dadurch gekennzeichnet, daß die Komponenten der zweiten Baugruppe (3) in einem röhrenförmigen Gehäuse (40) montiert sind, und daß das Mantelfläschchen (4) durch Preßpassung in dem röhrenförmigen Gehäuse angebracht ist.

5. Spritzensystem nach einem der Ansprüche 1 - 4, dadurch gekennzeichnet, daß es sich bei dem Kanülenmittel (20) um eine doppelseitige Nadel mit einem Flansch (24) zur Steuerung ihrer innerhalb der zweiten Kappe (18) eingenommenen Längsposition handelt.

Revendications

1. Système de seringue pré-remplie pour des produits pharmaceutiques à deux composants, comprenant la combinaison d'un premier et d'un deuxièmne sous-assemblages, le premier sous-assemblage comprenant un flacon pharmaceutique sans fond (2) contenant un premier composant d'un produit pharmaceutique, ledit flacon ayant un goulot de remplissage, une fermeture pénétrable retenue sur ledit goulot par un premier capuchon annulaire (30), et une extrémité de fond ouverte fermée hermétiquement par un premier piston (32) avec une configuration de raccord sur la face du premier piston adjacente à l'extrémité de fond ouvert à l'intérieur du flacon, et le deuxième sous-assemblage (3) comprenant un réceptacle (4) pour un deuxième composant fluide du produit pharmaceutique, un plongeur tubulaire (16) ayant un raccord (17) à une extrémité pour le raccord subséquent à la configuration de raccord (14) dudit premier piston (32), un deuxième capuchon (18) connecté de manière amovible audit plongeur, qui peut être ajusté par ajustement serré audit premier capuchon (30), et un moyen de canule (20) pouvant faire saillie par ajustement serré dudit premier capuchon (30) audit deuxième capuchon (18) pour pénétrer dans ladite fermeture pénétrable, caractérisé en ce que ledit réceptacle dudit deuxième sous-assemblage comprend un flacon coquille (4) ayant une extrémité ouverte fermée par un deuxième piston (6), ledit plongeur tubulaire (16) étant concentrique et en relation téléscopique avec ledit flacon coquille, et en ce que ledit moyen de canule (20) est également capable de faire saillie, lors de l'ajustement serré dudit premier capuchon (30) audit deuxième capuchon (18), pour pénétrer dans ledit deuxième piston (6) et placer ledit flacon sans fond (2) et ledit flacon coquille (4) en communication fluide par le biais dudit moyen de canule (2), du fluide provenant du flacon coquille étant ainsi transféré au flacon sans

fond en téléscopant ledit flacon coquille par rapport audit plongeur (16).

2. Système de seringue selon la revendication 1, caractérisé en ce que le flacon coquille (4) a un diamètre permettant de le téléscoper dans ledit plongeur (16), et des moyens adaptateurs (8) sont prévus dans ledit deuxième sous-assemblage, s'étendant entre ledit deuxième capuchon (18) et une configuration de raccord (14) sur ledit deuxième piston (6) pour maintenir la position de ce dernier au cours du téléscopage du flacon coquille par rapport au plongeur.

3. Système de seringue selon la revendication 1, caractérisé en ce que le flacon coquille (4) a un diamètre permettant de le téléscoper autour dudit plongeur (16), et lesdits moyens (17) sur le plongeur pour le raccord à la configuration de raccord du premier piston (32) sont initialement raccordés au moyen de raccord (14) sur le deuxième piston (6).

4. Système de seringue selon la revendication 3, caractérisé en ce que les composants du deuxième sous-assemblage (3) sont assemblés à l'intérieur d'un logement tubulaire (40), et le flacon coquille (4) est ajusté par pression à l'intérieur du logement tubulaire.

5. Système de seringue selon l'une quelconque des revendications 1-4, caractérisé en ce que le moyen de canule (20) est une aiguille à deux extrémités, avec une bride (24) pour commander sa position longitudinale reçue à l'intérieur du deuxième capuchon (18).

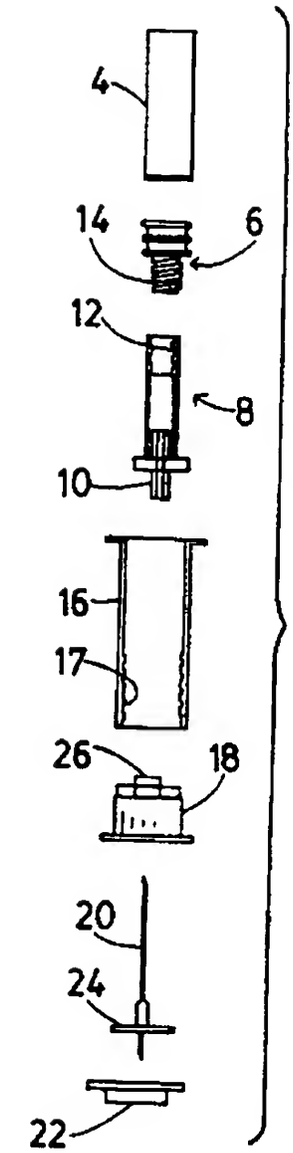

FIG.1A

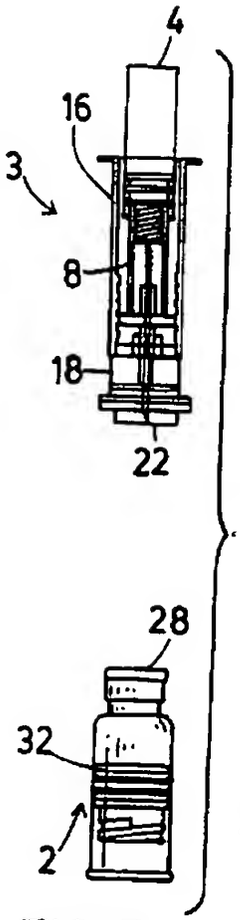

FIG.1B

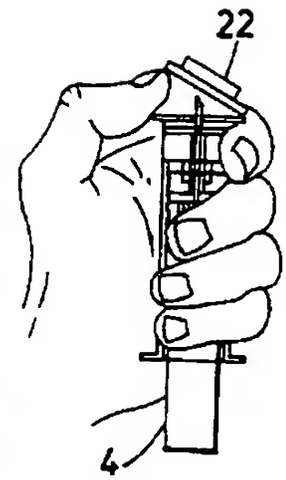

FIG.1C

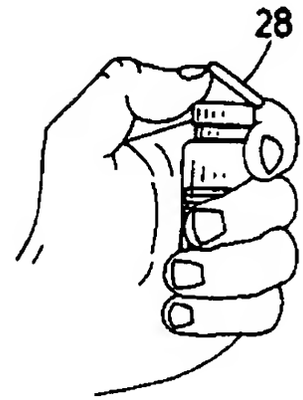

FIG.1D

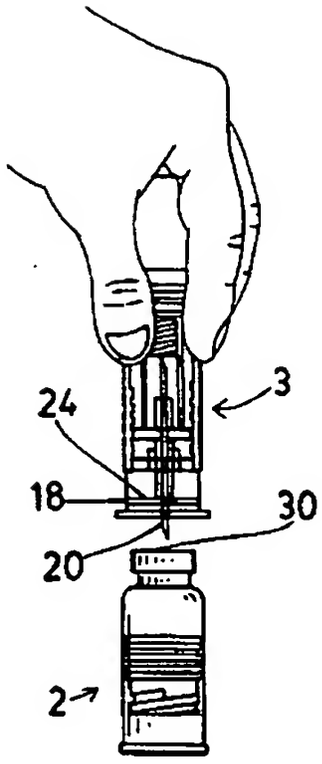

FIG.1E

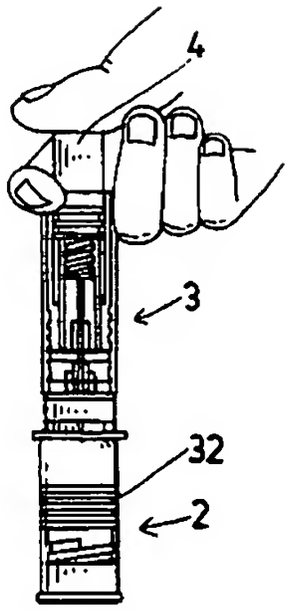

FIG.1F

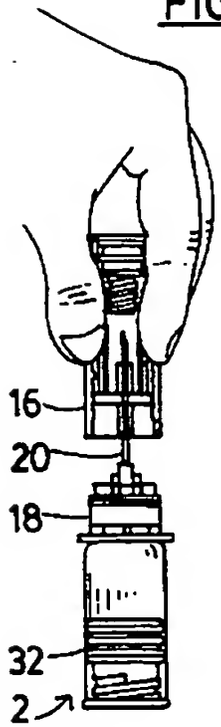

FIG.1G

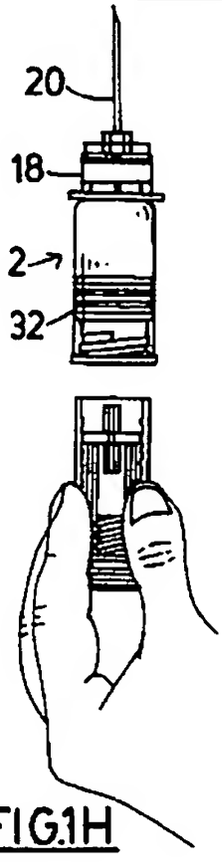

FIG.1H

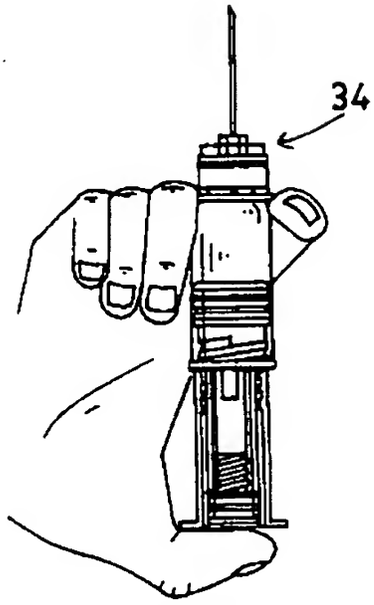

FIG.1I

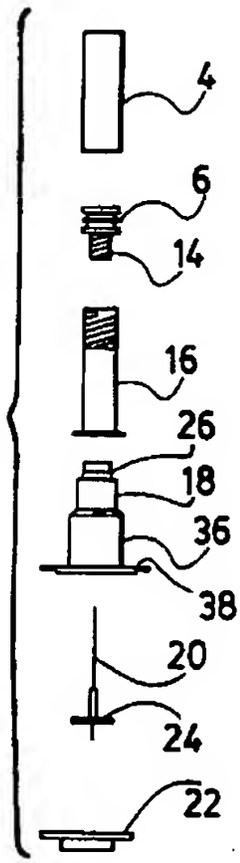

FIG. 2A

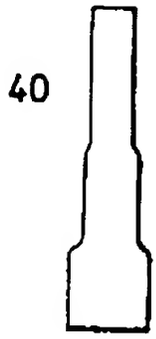

FIG. 2B

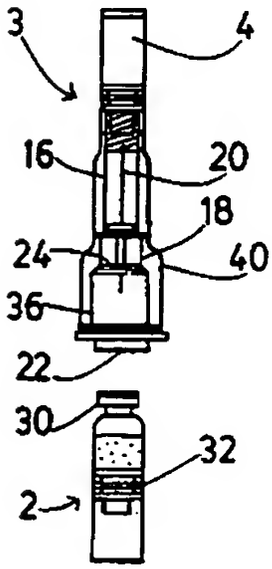

FIG. 2C

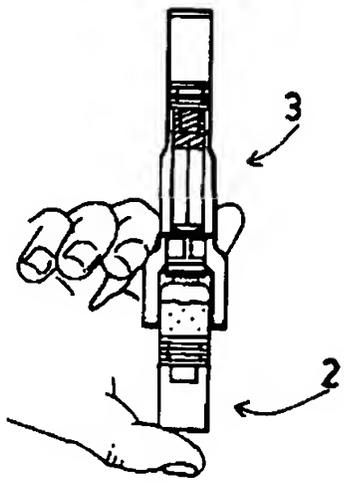

FIG. 2D

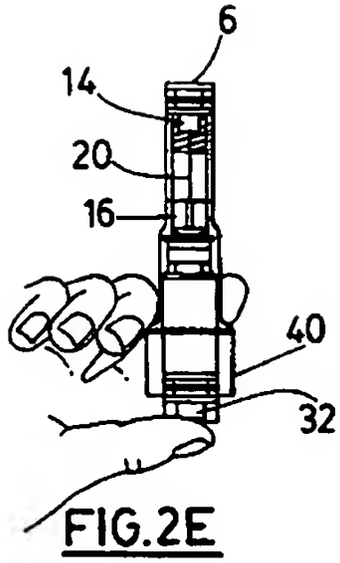

FIG. 2E

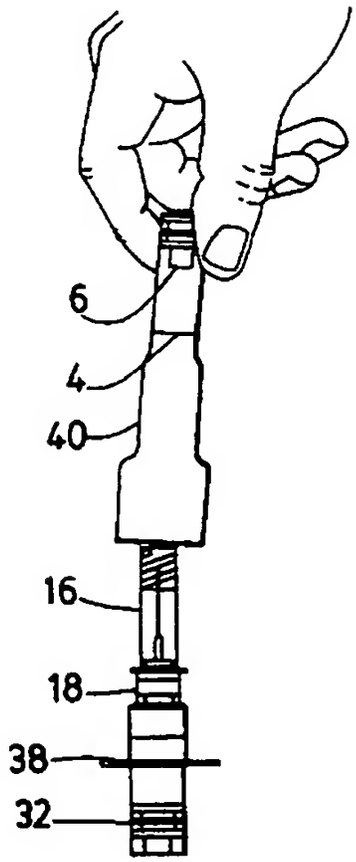

FIG. 2F

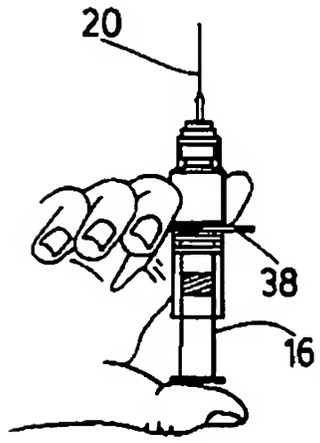

FIG. 2G